

METHOD FOR STORING AND HANDLING A ROLL IN A PAPER MACHINE,
INCLUDING A ROLL BOX.

Technical Field

5 The present invention relates to a method for storing and handling a roll of a paper machine, board machine, or finishing machine, in which method a special base is arranged for the roll, for moving the roll from its operating location to a roll store and/or to a means of transportation, or for storing the
10 roll in the roll store. The invention also relates to a roll box for use in the method.

Background of the Invention

When a roll is removed from its operating location, it is generally stored on top of a base prepared for it. Usually, the
15 roll is also secured on its base, so that the roll and the base can be moved together. When a roll is transported from the manufacturer to the operating location, and later from the operating location for servicing or renovation, structures are added around the base to form a box. Despite the box, however,
20 the roll is subject to variations in temperature and humidity, so that the box can only be used during transportation. Even then, the roll suffers from variations in conditions, therefore an attempt is made to keep the roll in the box for as short a time as possible. This leads to a tight transport schedule and
25 other special arrangements when handling the roll.

At the operating location, such as in a paper mill, there are generally spare rolls for the rolls being used in the machines. As the rolls used in paper machines, board machines, and
30 finishing machines are large and heavy, a gantry crane is usually needed to move them. Spare rolls and other rolls that have been removed from their operating locations are stored in a special roll store, which usually has to be located close to the machine hall. This is because the roll store gantry crane
35 transfers the roll to the machine hall gantry crane, which then

moves it to the machine. A gantry crane or some other sufficiently powerful crane is also required to load the roll onto a truck. The hoists on trucks cannot handle large and heavy rolls.

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A general drawback when handling and storing present-day rolls is the acquisition and maintenance of special stores and equipment. The rolls demand a special roll store, which must be dimensioned according to the most demanding roll. The temperature and humidity in the roll store must be constantly maintained at a suitable level for the roll. In practice, the roll store then becomes large, so that the maintenance of suitable conditions consumes a great deal of energy. In addition, the rolls can usually only be handled with a gantry crane, which must correspondingly be dimensioned according to the largest roll. However, the capacity utilization of the gantry crane remains very low, as rolls are changed relatively seldom. The unsatisfactory final result is a large and warm roll store, with a massive gantry crane. The loading of roll boxes onto various means of transportation is also one of the problematic aspects of the state of the art.

Summary of the Invention

The invention is intended to create a method, by means of which a roll of a paper machine, board machine, or finishing machine can be handled and stored more easily and with the aid of simpler equipment. In addition, the invention is intended to create a roll box for use in the method, which can be used continuously, for both roll transportation and storage, without needing special buildings and handling equipment. ~~The characteristic features of the invention appear in the accompanying~~ Claims. The roll box according to the invention forms not only a transport base, but also a storage space. In addition, the roll box can be handled using many different kinds of equipment, which are general equipment at the place of use of rolls. As they can be easily moved, the rolls need not be stored close to the machine, allowing the location of the roll store to be

chosen freely. This also permits existing roll stores to be used more productively while the new stores need not be all in one place or heated. Each roll is stored in the roll box in suitable conditions. The roll box according to the invention
5 suits all roll-like objects, but especially large and fragile rolls. The roll box does not represent a large investment, because even at present transportation bases are made for most new rolls and, in many cases, paper mills additionally purchase a separate box for transporting the roll.

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In the following, the invention is described in detail with reference to the accompanying drawings illustrating some embodiments of the invention, in which

Brief Description of the Drawings

15 Figure 1 shows a roll box according to the invention seen from the side, with the roll and the cover raised,

Figure 2 shows an axonometric end view of the base of a roll box according to the invention and a roll secured to it,

20 Figure 3 shows a diagram of the various stages of the method according to the invention,

Figure 4 shows a side view of one manner of loading applying the method according to the invention.

Detailed Description of the Invention

25 Figure 1 shows a side view of a roll box according to the invention. In the rest of the disclosure, the roll box will be referred to more simply as a box. The box includes a base 11 and a cover 12 fitted to it. It may be possible to lift the cover 12 entirely, as shown in Figure 1, or it may be able to
30 be moved to the side, or may be equipped with a top that can be opened. The roll 13 is preferably lifted onto and off base 11 using a gantry crane, which is generally available in machine halls and maintenance areas. In addition, base 11 has suitable devices 14 for securing roll 13.

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Cover 12 preferably extends outside base 11, so that the box can be closed tightly. Various kinds of base have been previously used in the transportation of rolls, but the box 10 according to the invention preferably includes support wheels 15, at least at one end of the base 11. The support wheels 15 are arranged in such a way that the axis around which they rotate is set essentially transversely to box 10. In other words, box 10 can be moved on support wheels 15 in its longitudinal direction. In addition, there are connecting devices 16 at the other end of box, allowing the box to be handled by a transportation vehicle, such as a forklift truck 22. Thus, the movement of the box no longer requires a gantry crane. At the same time, the handling of the box becomes less restricted, as it is no longer dependent on the tracks of gantry cranes.

Unlike known boxes, box 10 according to the invention is also used to store roll 13. For this purpose, box 10 includes devices 17 for maintaining heat and humidity conditions within box 10 suitable for roll 13. Such a box may also include the support wheels and connecting devices referred to above, or may have none of these. In the latter case, the box is handled mainly by lifting, for example, using a gantry crane.

In order to stabilize the conditions to be suitable for the roll, the devices 17 includes air-conditioning equipment and monitoring and control equipment for it. In addition, insulation 18, which essentially covers the entire box 10, is fitted to the base 11, the cover, or both. Because the base carries the weight of the roll, the cover may be of a lightweight construction. It is preferable to use a sandwich method in its manufacture, so that the final result is a light, but nevertheless stiff cover. The cover is also manufactured and fitted to the base in such a way that the closed box is airtight. Thus, little energy is used to maintain the internal conditions in the airtight and insulated box. Even the shaping of the box can affect the energy economy of the box. A streamlined box has a

low air resistance. In addition, snow and water will immediately run off a suitably shaped cover.

During storage, box 10 is connected to the mains electricity
5 and information networks with the aid of connecting cables 19.
In all other respects, box 10 operates completely independently. As required, the air-conditioning device can either heat or cool the air inside the box while also maintaining the desired humidity. In addition, the air-conditioning device
10 circulates the air, evening the temperature and humidity in the different parts of the box. The air-conditioning device can be installed to operate at a constant output, but preferably measuring and control devices can continually monitor and adjust the operation of the equipment, and thus the conditions
15 inside the box. In this way, if problems arise, the box can be examined immediately, before the roll is damaged. During loading onto a vehicle, the box can easily be disconnected from the power supply, because large rolls in particular store a great deal of heat. Alternatively, the box can incorporate, for
20 example electrical or thermal batteries, in case of power cuts. During transportation, the box is connected to the electrical system of the means of transport.

The box is intended to be handled by some transportation
25 vehicle. Generally, there are numerous forklift trucks at the operating locations of rolls, with sufficient capacity to transport the box and the roll. After all, the support wheels carry at least half of the weight of the box. In their simplest form, the connecting devices are concavities formed in the
30 base, into which the arms of the truck's fork fit and lock. Other types of connecting devices are also possible. In addition, the support wheels of the box are arranged transversely within the external dimensions of the box. Thus, the support wheels do not add to the overall dimensions of the box,
35 which reduces the storage space needed. At the same time, the support wheels are protected and two large boxes can be loaded

side by side onto the means of transport, such as a truck with a semi or full trailer.

More highly developed embodiments may have not only connecting
5 devices, but also a second set of support wheels (not shown) at the other end of the base. This allows the box to be handled by devices that have insufficient capacity to lift it. A power source and steering devices may also be attached to the aforesaid second set of support wheels. In such a case, the box
10 can be handled without a separate transportation vehicle, so that in a sense the box is its own transportation vehicle.

Figure 2 shows base 11 with a roll 13 secured to it. The same reference numbers are used for the parts with a similar
15 function. Roll 13 can be secured to base 11 in several different ways. For example, base 11 includes fixed supports 14', on which roll 13 is set, secured by its bearing journals. Another alternative is to secure the bearings directly to the base, when the roll can be rotated. This roll rotation, with the
20 addition of oil-circulation lubrication, will keep the bearings in operating condition, so that the roll is ready for use immediately after installation. Certain rolls also demand rotation during storage. If necessary, the air-conditioning device can be used to raise the temperature of the roll to near
25 to the operating temperature before installation. In addition, the storage space can act as a servicing base. The base can also be equipped with an electrically operated hydraulic hoist, which allows the bearing assemblies to be dismantled and installed. Similarly, the roll's documentation and service
30 tools and spare parts travel in the box. In this case, for example, the bearings can be repaired and serviced practically anywhere. The box can also include accompanying memory and positioning devices, to identify the roll and determine its position at any time, and to record servicing information.

Figure 3 shows various ways of handling the box. The box is preferably transported in a horizontal position, with the aid of a traction device or forklift truck 22, from the machine hall to the roll store 20 and back (box A). According to the method, roll box 10 is equipped with wheels 15 and roll box 10 is moved by being pushed, pulled, or both by a transport vehicle, such as forklift truck 22. Thus, the roll store 20 can be freely located in the vicinity of the operating location, while a gantry crane is not needed in roll store 20. In the same way, the box is loaded from loading bay 21 onto a road-haulage vehicle or a train (box B). Short and light boxes can also be loaded sideways (box C).

According to the method, the base is made into a box. Thus, suitable heat and humidity conditions for the roll are created and maintained inside box 10. A box according to the invention can be adapted as a winter store in a covered or cold store area, in which there need not be a gantry crane. Generally, rooms or areas, in which the heat and humidity conditions are poorly regulated, or not regulated at all can be used as roll stores. Thus, in principle, the box can also be stored outdoors, but in that case the energy consumption of the air-conditioning equipment will probably increase. On the other hand, short-term storage outdoors has advantages when the roll is sent for servicing or surfacing. In that case, the loading and unloading of the box can be carried out independently by the transport crew, irrespective of whether a gantry crane is available. This increases the flexibility of logistics. An unheated store is a preferable place for the box with its roll, because the conditions are even throughout the year, and are not disturbed by rain and wind. Thus, for example, an empty end-product store is suitable as a roll store. As logistics become more efficient, end-product storage space is being released at mills, so that additional investments are not required for a special roll store.

Figure 4 shows box 10 being loaded onto a road-haulage vehicle. In Figure 4, the bed of semi-trailer 23 is arranged at the height of loading bay 21, when box 10 can be simply pushed by vehicle 23. This also permits the use of a covered trailer, as the box is loaded by pushing and not by lifting. At the same time, loading is speeded up, because it is not necessary to remove the cover of the load space. Lifting devices 24 according to the example are available for adjusting the height. Sufficient height adjustment can also be obtained by using the vehicle's air suspension.

In general, boxes are dimensioned taking the size of the means of transportation into account. In addition, standard securing devices (not shown) are fitted to the box, to secure it to the means of transport. So-called container locks are preferable as the securing devices. The roll is secured to the base by means of retaining devices that will withstand the stresses of loading and transportation. All that the transport crew must do is to secure the container to the vehicle. In addition to the securing devices, frameworks can be attached to the box, to allow boxes to be transported and stored on top of each other. It is preferable to use container locks with the frameworks too. In this case, a sufficiently powerful crane must be available.

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A roll box according to the invention can be used to easily create a suitable storage solution for each roll, without investments in an expensive heated warehouse and a gantry crane. The solution permits the use of leasing or a similar flexible form of financing, releasing capital for more productive purposes. In addition, energy is saved, as the space to be heated is substantially reduced in comparison to a conventional store. The handling of the roll box also becomes easier and more flexible.

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